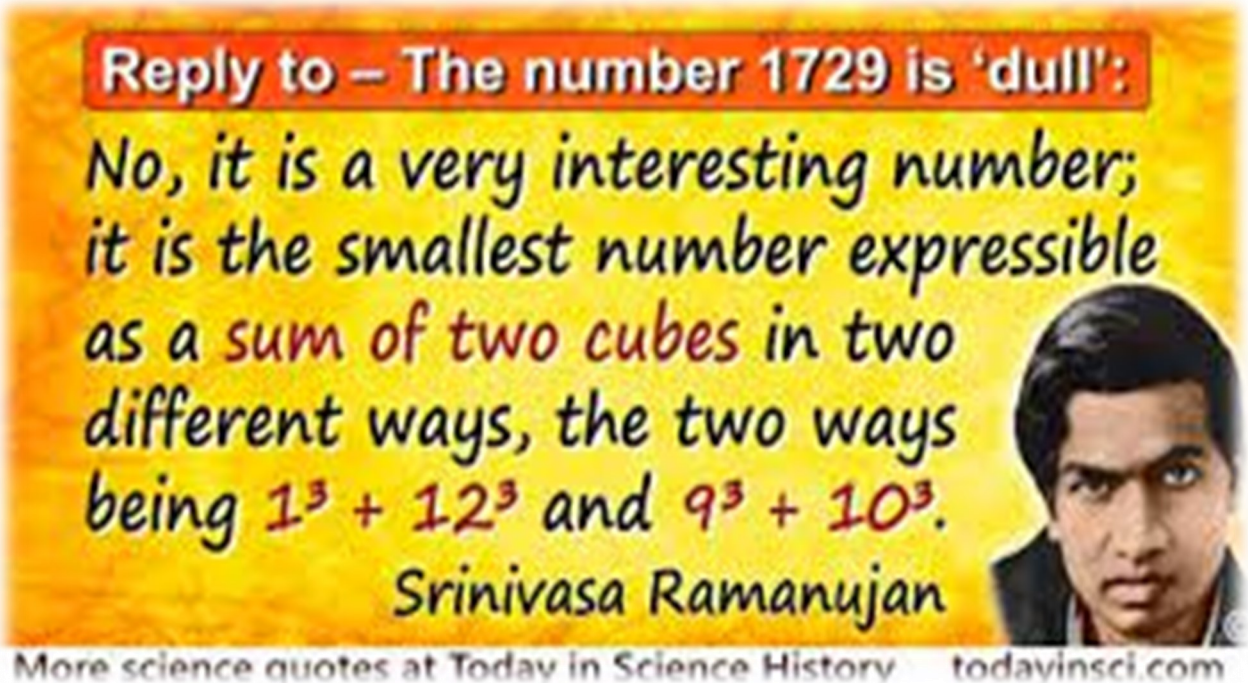
# 108
# Greatest Of All Times

GLOBALLY SELECTED
PERSONALITIES

ISBN:978-81-984029-3-6

Compiled by:
Prof Dr S Ramalingam

22 Dec 1887 <::><::><::> 26 Apl 1920




Na Subbureddiar 100 Educational Trust
[An ISO 9001 - 2015 Certified]
AD-13,5th Street, Anna Nagar West, Chennai - 600 040
www.nasubbureddiar100.in

22 Dec 1887

26 Apl 1920


This is the WRAPPER of the Book released/published by the
Department of Mathematics of
Dr MGR Educational and Research Institute, Chennai – 600 095
Kindly visit the Web Link to reach/read the cited BOOK:

https://archive.org/details/sr-full-book/mode/2up

# Srinivasa RAMANUJAM

## Annotated

# Webliography

### Webliography Defined

- **Bibliography:**
  Lists books and other printed works referenced in a research paper
- **Webliography:**
  A product born out of web research, represents a list of websites used
- **Annotate:**
  To write a few sentences that both describe and critique the website

Sometimes, we are asked to compile and present our bibliographies to our professors before we turn in our actual essays. We might be asked to comment on our sources to help establish a context for how we will use them, as well as to describe how we have evaluated them as a worthy authority over information. To do this, not only do we supply the list of sources, we write out a paragraph for each of them that details these considerations.
This is called an "annotated bibliography."
If it is done for Web links or websites or webpages, then it is
"Annotated Webliography"

* * * * * * * * * * * *

### [01] Ramanujan's Notebooks by C Berndt

https://archive.org/details/ramanujans-notebooks/Ramanujan%20Notebooks%20I/

This site contains the details of Ramanujan's Notebooks authored by Bruce C. Berndt Department of Mathematics, University of Illinois

Urbana, IL 61801 US.A. It contains four volumes: 9 chapters (368 pages) in Vol I; 6 chapters (372 pages) in Vol II; 6 chapters (524 pages) in Vol III; and 10 chapters (231 pages) in Vol IV.

## [02] Manuscript Book 2 of Srinivasa Ramanujan

http://www.math.tifr.res.in/~publ/nsrBook2.pdf

This is very rare note book containing XXI chapters, providing his original work in his own handwriting. Go through and enjoy his hand writing as well as mathematical skill. [356 pages]

## [03] A Formula of Srinivasa RAMANUJAN

https://core.ac.uk/download/pdf/82155486.pdf

This is a paper by R Sitaramachandra Rao [Department of Mathematics, University of Toledo, Toledo, Ohio 43606, USA] on "A Formula of S Ramanujan". JOURNAL OF NUMBER THEORY 25, 1-19 (1987).

This Paper discusses various equivalent formulations for the sum of an infinite series considered by S. Ramanujan; also, it evaluates, in closed form. various classes of related infinite series.

## [04] Srinivasa Ramanujan and Maths in India [PPT]

https://www.aspenphys.org/public/2014_slides/shankar.pdf

Containing 37 PPT slides covering various aspects of S Ramanujan – life, place of living, his notes, his Magic Square, his visit to England, etc.,

## [05] Manuscript Book of Srinivasa Ramanujan

https://www.pdfdrive.com/manuscript-book-of-srinivasa-ramanujan-volume-1-d177949115.html

Containing web links to 10 works of S Ramanujan – (1) Manuscript Book of Srinivasa Ramanujan Volume 2; (2) Ramanujan's Lost Notebook: Part I; (3) Ramanujan's Lost Notebook: Part II; (4) Ramanujan Notebooks; (5) Ramanujan's Lost Notebook. Part III; (6) Ramanujan's Lost Notebook: Part V; (7) Ramanujan's Lost Notebook: Part IV; (8) Notebooks of Srinivasa Ramanujan: Volume II; (9) The Man Who Knew Infinity: A Life of the Genius Ramanujan; (10) Collected Papers of Srinivasa Ramanujan.

All ten papers have 4142 pages and have been downloaded 89784 times !

## [06] Ramanujan Museum and Education Centre

https://casualwalker.com/museum-for-the-man-who-knew-infinity-ramanujan-museum-royapuram-chennai-travel-guide/

Casual Walker is a curious discovery and recommendations journal that explores a wide range of compelling, thoughtful, and unique local photo stories - connecting travel, traditions, culture, places, temples, art, food & eats, books, events and reviews. We visually walk and guide you to our local world which is full of beauty, adventure, and charm.

To honour this world renounced mathematical genius, Ramanujan Museum was established in 1993 in Chennai by Mr P.K. Srinivasan a Math educator who spent almost 25 years collecting the resources which celebrate Srinivasa Ramanujan's life and massive contributions to the world of mathematicians. The museum was accommodated in the premises of the Avvai Cultural Academy, Royapuram, Chennai by Mr A. T. Bose who is currently head and leading the Ramanujan Museum along with its director Ms Meena Suresh.

To celebrate Ramanujan's birthday on December 22nd, each year the Ramanujan Museum organizes an annual lecture by eminent mathematicians. The Centre also has programmes to spread awareness of mathematics among children.

**A visit will be a highly inspirational and informative to learn about the life and works of the great mastermind.**

## [07] India's greatest Mathematical Genius

https://mathshistory.st-andrews.ac.uk/Biographies/Ramanujan/

MacTutor is a free online resource containing biographies of more than 3000 mathematicians and over 2000 pages of essays and supporting materials. MacTutor is constantly expanding and developing. The list containing the names, alphabetically, chronologically, country wise, birth country wise. Also, this site contains the history of mathematics country wise, in several cultures, topics wise, etc., Very useful to research scholars in mathematics.

## [08] Self-taught pure mathematician.

https://www.famousscientists.org/srinivasa-ramanujan/

About 2.3 million years ago our ancestors invented their first primitive tool, the split stone, which they used for cutting and scraping.

Modern humans first appeared about 200,000 years ago. About 50,000 years ago they (or should that be we?) began to use language, symbols, and more complex tools.

As inventions and discoveries added to one another, human civilization, technology, and science advanced and evolved.

This site provides an exhaustive list of international scientists in various fields: physics, mathematics, chemistry, astronomers, biologists, health scientists, scientists in ancient times, etc.,

## [09] 200 Greatest Mathematicians

https://fabpedigree.com/james/gmat200.htm

This site provides the Greatest Mathematicians of the Past ranked in approximate order of "greatness." To qualify, the mathematician must be born before 1930 and his work must have breadth, depth, and historical importance. Also, gives the background of ancient mathematicians, early Vedic mathematicians. The site offers the photographs of several mathematicians.

## [10] Who was Srinivasa Ramanujan?

https://writings.stephenwolfram.com/2016/04/who-was-ramanujan/

Stephen Wolfram is the creator of Mathematica, Wolfram Alpha and the Wolfram Language; the author of A New Kind of Science; the originator of the Wolfram Physics Project; and the founder and CEO of Wolfram Research. Over the course of more than four decades, he has been a pioneer in the development and application of computational thinking—and has been responsible for many discoveries, inventions and innovations in science, technology and business.

His paper [27 April 2016] was written by him after seeing the film **"The Man Who Knew Infinity"**. The paper, astonishingly, covers the all aspects of Ramanujan's life and his works.

## [11] S Ramanujan – Indian Mathematician

https://aptinfo.in/profile-and-life-history-of-srinivasa-ramanujan/

Contains an interesting pictorial profile of Srinivasa Ramanujan. Also, provides a very brief background of Srinivasa Ramanujan. The site provides web links to some other famous mathematicians and scientists.

## [12] A Mathematical Legacy

https://www.thoughtco.com/srinivasa-ramanujan-4571004

ThoughtCo is a premier reference site with a 20+ year focus on expert-created education content. We are proud to be one of the top-10 information sites, as measured by comScore, a leading Internet measurement company. In 2018, ThoughtCo received a Communicator Award in the General Education category and a Davey Award in the Education category.

At ThoughtCo, we believe that great inspiration begins with a question, and we help 13 million users answer theirs every month. Whether yours is about science and math, humanities and religion, or architecture and the arts, our in-depth articles, written by literature writers, Ph.Ds., and experienced instructors, are designed to give you the answers and information you need in a clear, easy-to-navigate format. So, whether you are asking for a class, that next conversation, or just because you want to know, ThoughtCo can help.

This web page provides a short biographical details/information of Srinivasa Ramanujan and also, the web links to some famous international mathematicians.

## [13] Contribution of India to Mathematics – A Talk [Video]

https://www.youtube.com/watch?v=EcjHccvahHk&ab_channel=IndiaScience

"**The contribution of Indian mathematicians**" was presented in a webinar by renowned mathematician Professor Manjul Bhargava. The webinar was presented by the Department of Science & Technology, government of India.

## [14] Indian Mathematics – An Overview [Video]

https://www.youtube.com/watch?v=p2WankcGP3Q&ab_channel=nptelhrd

**"Mathematics in India - From Vedic Period to Modern Times"** by Prof. M.D.Srinivas, Prof.M.S.Sriram & Prof.K.Ramasubramanian, Department of mathematics, IIT Bombay.

## [15] A Brief History of Indian Mathematics

https://www.esamskriti.com/e/Spirituality/Education/A-brief-history-of-Indian-Mathematics-1.aspx

MATHEMATICS has played a significant role in the development of Indian culture for millennia. Mathematical ideas that originated in the Indian subcontinent have had a profound impact on the world. Swami Vivekananda said: 'you know how many sciences had their origin in India. Mathematics began there. You are even today counting 1, 2, 3, etc. to zero, after Sanskrit figures, and you all know that algebra also originated in India.'

A Paper by Mr Vijay Kumar Murthy on "**A brief history of Indian Mathematics**".
The paper elaborately covers the history of Indian Mathematics from 3000 BC to 20$^{th}$ century.

## [16] Mathematics in Ancient India – A Paper

https://www.ias.ac.in/article/fulltext/reso/007/04/0004-0019

"**Mathematics in Ancient India**" – a Paper by Amartya Kumar Datta, Associate of Mathematics, Indian Statistical Institute, Kolkata. Paper explores the history of mathematics in India from Vedic period to the present day.

## [17] Ancient Mathematical Genius in India

https://www.artofliving.org/in-en/culture/amazing-india/how-ancient-mathemetical-genius-began-in-india

***Amazing facts about India.***
India is a land where mathematics is coded into everything – from divinity to nature to knowledge to the Vedas and music. Indian philosophy has embraced the concept of zero or *shunya* at one end of the spectrum to *anantha*, infinity, at the other end. The global spread of theses ideas allowed intellectuals around the world to further develop science.

Albert Einstein once said: "We owe a lot to the Indians who taught us how to count, without which no worthwhile scientific discovery could have been made."

What are those revolutionary concepts? Bharath Gyan, a passionate research initiative, is painstakingly dotting the pieces together, foraging amongst lost remnants to keep the glorious past alive and known

## [18] List of Famous Indian Mathematicians

https://www.jagranjosh.com/general-knowledge/list-of-famous-indian-mathematicians-from-ancient-to-modern-india-1498193066-1

Mathematics is the study of topics such as quantity (numbers), structure, space, and change. The Aryabhata, Brahmagupta, Mahāvīra, Bhaskara II, Madhava of Sangamagrama, and Nilakantha Somayaji are classical Indian mathematicians whose contributions made them immortal. Here, we are giving the list of Indian mathematicians from Ancient to Modern India their contributions. Provides a list of 53 mathematicians from ancient India to the present day with their period of existence and their contribution to mathematics.

## [19] Top TEN Most Intelligent People on Earth

https://www.jagranjosh.com/general-knowledge/top-10-most-intelligent-people-on-earth-1477392275-1

Without geniuses History can't be created. Persons like Newton, Thomas Alva Edison, Leonardo da Vinci, Galileo Galilei etc are still alive due to their methods, ideas and formulas. There are also people who have gained fame and achieved in small age with their mind-boggling IQ levels, exceptionally intelligent and talented including brilliantly accomplished academics, former child prodigies etc. We can also call them geeks, nerds or superb sharp intellectuals. Here are 10 most intelligent people on earth those who have created history.

## [20] S RAMANUJAN: The Mathematician & His Legacy [Video]

https://www.google.com/search?rlz=1C1CHZN_enIN990IN991&sxsrf=AJOqlzWUgYPAX9K7AFFiGmoazSCRKHzu8w:1676714424393&source=lnms&tbm=vid&sa=X&ved=2ahUKEwjMiZ_95579AhV303MBHfofDNUQ_AUoBHoECAEQBg&q=srinivasa%20ramanujan%20videos&biw=1350&bih=640&dpr=1#fpstate=ive&vld=cid:40fe85dd,vid:uhNGCn_3hmc

Each year, December 22nd is celebrated as the National Mathematical Day in India to commemorate the birth anniversary of the self-taught

genius – Srinivasa Ramanujan whose work continues to intrigue, inspire and challenge mathematicians around the world. His fertile mind envisioned a world where science and mathematics converge to uncover fundamental principles governing our universe. Nearly a hundred years after his death, mathematics has slowly developed tools that are unravelling some of the secrets behind his intuitive suppositions. His oeuvre has opened up new vistas of possibilities, new branches of mathematics have sprouted and proliferated and found application in different fields of sciences, implausible in his own times. **The Film brings together his life on screen, with period enactments, interviews and animation.**

## [21] Mrs Janakiammal (Wife of S Ramanujan) [Video]

https://www.youtube.com/watch?v=1qaRtMjTD-k&ab_channel=Kasturi

This is a rare and wonderful video covering an interview with Mrs Janakiammal, wife of great mathematician S Ramanujan. She vividly narrates her life and experiences with her husband.

## [22] Ramanujan: The Man Who Knew Infinity

https://www.indiascienceandtechnology.gov.in/listingpage/ramanujan-man-who-knew infinity#:~:text=Ramanujan's%20contribution%20extends%20to%20mathematical,of%20many%20algorithms%20used%20today.

This information from the Department of Science and Technology, government of India, providing all important information and other details about S Ramanujan. Also, it contains several interesting information about him and other related areas of interest about mathematics and other areas connected to S Ramanujan.

## [23] Ramanujan Prize

https://www.indiascienceandtechnology.gov.in/india-international-fellows?combine=Ramanujan%20Prize

This information is from the Department of Science and Technology, government of India, providing the details about Ramanujan Prize and the list of recipients.
The government of India has taken several initiatives towards the international exposure of scientists working in India in addition to providing lucrative incentives to bring back the eminent scientists to the country vis-a-vis implementation of several International Fellowship Programmes / Schemes. The list of Ramanujan Prize winners

includes the names of the awardees, their affiliation, year of the award and area of specialisation.

## [24] Ramanujan Fellowship

https://www.indiascienceandtechnology.gov.in/programme-schemes/research-and-development/ramanujan-fellowship

This information is from the Department of Science and Technology, government of India, providing the details about Ramanujan Fellowship and the list of recipients.

These International Fellowships include:

i) Fellowships for attracting highly skilled, outstanding researchers and scientists of Indian origin working abroad by providing them an attractive avenue to pursue their R&D interests in Indian Institutions.

ii) Fellowships providing opportunities to the best and brightest Indian students/ researchers / scientists to go abroad and gain exposure to world class research facilities and peers in leading institutions, thereby helping to build long-term R&D linkages and collaborations.

iii) Besides these, Indian scientists regularly apply for other international fellowships and their contributions are significant in the international arena.

These efforts have helped develop a pool of talents who are helping in the furtherance of excellence in science in the country. This Section provides information regarding the scholars honoured with these International Fellowships, the year of award, their affiliations and their area of work. It includes information regarding scholars like Ramanujan Fellows, Ramalingaswami Fellows, Welcome Trust/DBT India Alliance Fellows, Fulbrighters, Human Frontier Science Program (HFSP) Fellows, Indo-Australia Early and Mid-Career Researchers (EMCR) and so on...

The scheme provides support to active researchers/ scientists/engineers who want to return to India from abroad and contribute their work for the country.

**Programme Type:** Research and Development

**Ministry / Department:** Department of Science & Technology (DST), Govt of India
**Focus Area:** All Areas of Science
**Target Audience:** Scientists and Engineers
**Funding Agency:** Science and Engineering Research Board (SERB)
**Eligibility:** Indian scientists and engineers working abroad and are below the age of 40 years. The Nominee should possess higher degree or equivalent, such as Ph.D. in Science/ Engineering, Masters in Engineering or Technology/ MD in Medicine, etc. and have adequate professional experience.
**Purpose:** Capacity Building, Research
**Funding Cycle:** Rolling
**Duration:** 5 Years
**Application Method:** Online
**Fellowship / Financial Assistance:** Fellowship will be Rs. 1,35,000/- per month (consolidated including HRA). A research grant of Rs.7.00 lakh per annum and Rs.60,000/- per annum as overhead charges


(😊) @ (😊) @ (😊)

Ramanujan with his Parents!

# Centenary AWARD

## Srinivasa Ramanujan Birth Centenary Award

To commemorate the Birth Centenary of the great Indian mathematician Srinivasa Ramanujan, the Indian Science Congress Association instituted this annual award in 1989 to honour a distinguished Scientist of the country.

The award carries a Gold Medal and Certificate. The awardee is entitled to T.A. (Air Fare-economy class - within the country) as per ISCA rules for attending the Annual session of the Science Congress in which he/she will receive the award.

The award is presented to the recipient either in the inaugural or Valedictory function of the Annual Session of The Indiana Science Congress Association.

Nominations for the Birth Centenary Award are invited from Members of ISCA Council.

The Executive Committee in its meeting held on October 13, 2012 resolved that a person shall not be eligible for more than one award /lecture in his lifetime. No one ( except ISCA young scientist awardees) shall be given the second ISCA award under any circumstances.

The Executive Committee in its meeting held on January 01,2019 resolved that while selecting ISCA awardees for ISCA awards their H index and Citation index (in SCOPUS and Google Scholar ) would be taken into account.

The Executive Committee in the Meeting held on October 15,2019 resolved that for this Birth Centenary award any life member of not less than Ten years of standing or continuous Annual Member of not less than Ten years of standing and also with Ten years of teaching and research experience in University/College or as a scientist in Government recognized Laboratory/institution can be nominated by a Council member. It is also recommended that the heads of the organizations which are providing funds to ISCA in any form cannot be nominated by a Council member for consideration of any award.

The awardee may be requested to deliver a lecture at ISCA Headquarters/ Chapters.

The final selection is made by a Selection Committee comprising the General President, Two general secretaries, Treasurer out of the candidates nominated.

The last date for receiving nominations is July 31 each year.

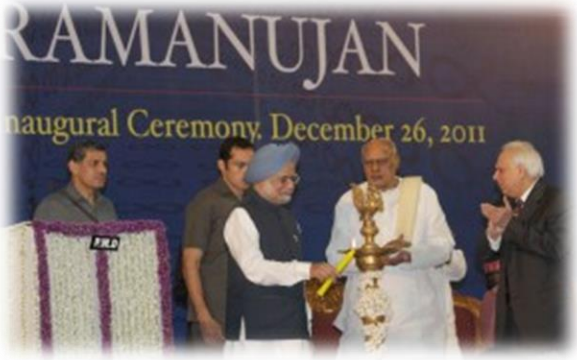
Participants of the Ramanujan Centenary Conference (June 1-5, 1987)
at the University of Illinois, Urbana-Champaign.


**Group photograph of Profs. G.E. Andrews (holding the Ramanujan Notebooks) with Mrs. Janakimammal, her family members and participants to the International Conference held at Chennai, to mark the birth Centenary of Ramanujan, 22-12-1987".**

**In the birth Centenary year, 1987, of Ramanujan's, on December 22, in the august presence of the Prime Minister Rajiv Gandhi, these 2 Volumes along with the 'Lost' Notebook of Ramanujan were released and the first copies given to Mrs. Janaki Ammal.**

Prime minister Manmohan Singh presented the prestigious Srinivasa Ramanujan Birth Centenary Award and a gold medal to JNT University-Kakinada (JNTU-K) vice-chancellor Allam Appa Rao at the inaugural session of the 98th Indian Science Congress Association (ISCA) held at SRM University in Chennai today.

**Manmohan Singh releasing the postal stamp on noted mathematician Shri Srinivas Ramanujan at his 125th Birth Anniversary celebrations**




Prime Minister Dr. Manmohan Singh opens the 125th Birth Anniversary Celebrations of Mathematician Srinivas Ramanujan in Chennai.

**India announced the birthday of celebrated mathematician Srinivas Ramanujan as 'National Mathematics Day'. The announcement was made by Prime Minister Dr. Manmohan Singh at the 125th Birth Anniversary celebrations of the mathematical genius in Chennai on Monday (December 26).**

@@@@@@@@@@@@@@@@@@@@@

# Ramanujan Museum

https://casualwalker.com/museum-for-the-man-who-knew-infinity-ramanujan-museum-royapuram-chennai-travel-guide/

# Srinivasa Ramanujan

**The Man Who Knew Infinity, was one of the World's greatest mathematical geniuses. Ramanujan had no formal training in pure mathematics, but he made great contributions to the analytical theory of numbers, infinite series and continued fractions, including solutions to mathematical problems which are considered unsolvable.**

To honour this world renounced mathematical genius, Ramanujan Museum was established in 1993 in Chennai by Mr P.K. Srinivasan a Math educator who spent almost 25 years collecting the resources which celebrate Srinivasa Ramanujan's life and massive contributions to the world of mathematicians. The museum was accommodated in the premises of the Avvai Cultural Academy, Royapuram, Chennai by Mr A. T. Bose who is currently head and leading the Ramanujan Museum along with its director Ms Meena Suresh.

To celebrate Ramanujan's birthday on December 22nd, each year the Ramanujan Museum organizes an annual lecture by eminent mathematicians. The Centre also has programmes to spread awareness of mathematics among children.

This museum treasures the pictures, letters and documents focusing on the greatest mathematician of the 20th Century. We can find the exhibits of numerous Ramanujan memorabilia, including photographs of the Ramanujan's home and family, Ramanujan's horoscope, Ramanujan's Mother Komalattammal, Ramanujan's wife Janaki, Ramanujan's early school/ Pachaiyappa's College days, Awards he received during his school time, his days at Trinity College – Cambridge, Ramajuman's three-part / volume notebooks, Ramanujan's various mathematical models, formulas and theorems, Indian Mathematical Society supporters, Ramanujan's postal stamp to commemorating his 75th Birth Anniversary, Ramanujan's correspondence with friends, relatives, and colleagues, as well as his passport, Ramanujan's handwritten job application for the post of a clerk at Madras Port Trust, Hardy's replies to Ramanujan's letters sent to him in early 1913. His supporters from early to last days, his handwritten letters and mathematical notebooks and much more Ramajuman's exiting work to be seen live and direct at the Museum.

**********

**Address:** Ramanujan Museum & Math Education Centre, 15/9, Somu Chetty, 4th Lane, Royapuram, Chennai, Tamil Nadu 600013. India

**Hours:** 10 AM to 7.30 PM (All working days)
**Phone:** 044 2596 0877 / **Email:** Ramanujanmuseum@yahoo.com

**Reaching:**

On Road: Taxis, buses and hired cars are easy ways to get around

Nearest Railway Station: Chennai Central and Chennai Egmore Railway station

Nearest Airport: Chennai International Airport

Please visit the web link to enjoy photo captures of Ramanujan Museum, Royapuram in Chennai.

**https://casualwalker.com/museum-for-the-man-who-knew-infinity-ramanujan-museum-royapuram-chennai-travel-guide/**

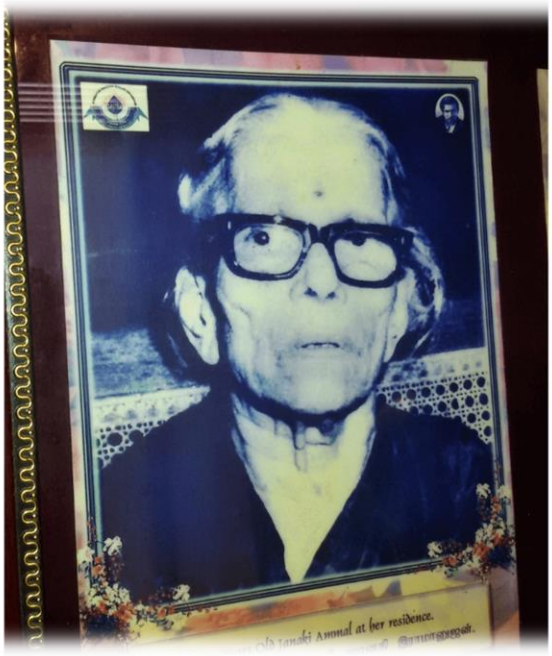
## Wife <-> Mrs Janaki Ammal

Also visit: https://en.wikipedia.org/wiki/Srinivasa_Ramanujan

# The Woman Who Transcended Infinity

*Great men often had selfless partners resolutely supporting them in pursuit of their dreams. This is the story of one such woman, **Janaki Ammal**, wife of the celebrated mathematician, Srinivasa Ramanujan.*

**********



## Janaki Ammal

**wife of the celebrated mathematician Srinivasa Ramanujan**

December 22nd is the birth anniversary of Srinivasa Ramanujan, the mathematics genius. Most of us have heard of Ramanujan. Thanks to the film 'The man who knew infinity', his life story is quite well known. But how many of us know about the woman who stood by him during his troubled years — his courageous wife who continued to celebrate him in her own quiet resilient way all her life? This story is about her — the woman who knew Infinity and perhaps transcended it too.

Her name was Janaki Ammal. She was barely 10 when she was married to the 21-year-old Ramanujan in 1909. Since she was too young to run a house, Janaki lived with her parents for the next 3 years. In 1912, Ramanujan got a job in the Madras (Chennai) Port Trust and Janaki's parents thought she was ready for the life of a householder. The couple moved into a small apartment in Triplicane, along with Ramanujan's mother, Komalatammal. Was this the beginning of a romantic phase in her life? Hardly.

For one, they were constantly under the watchful eye of her mother-in-law. Remember, Janaki was not even 14. For another, even by the conservative standards of those times, Ramanujan must have been an unromantic husband. She observed that he spent most of his free time in mathematical research and not even a loving wife could distract him from this first love. Despite all this, Janaki adjusted quickly to her new life. Perhaps romance would bloom in good time?

In 1914, Ramanujan had a breakthrough. He was invited to study mathematics in Cambridge. This was an opportunity of a lifetime but Ramanujan was in a dilemma! Overseas travel was taboo to orthodox Hindus, because they believed it would pollute the soul. Anybody who violated the taboo lost his caste and social status and was even ostracised.

Ramanujan was a deeply religious man and this complex problem tortured him intensely. He finally resolved it the religious way. After praying to his family deity, Namagiri Thaayaar, he declared that she had blessed the overseas trip. Janaki, who hadn't spent any time alone with Ramanujan in their brief time together, hoped to travel with him. By then, Janaki was 15 years old and naively asked Ramanujan if she could travel with him. However, Ramanujan declined, saying she was probably too young to travel. He was to regret that decision later.

Leaving behind his wife and mother, Ramanujan left for Cambridge. At Cambridge, he immersed himself in the joys of research . Those were his brightest years. Those were also his darkest years. He was alone in an alien culture. He was socially inept, with no friends except his own mentors in the mathematics department. The taboo still rankled in his mind. He was wary of eating outside, because even vegetarian food probably did not conform to puritanical Hindu standards. Good food was scarce anyway during war time. He cooked his own food at odd times during occasional breaks from research. He was overworked and undernourished, so something had to give: his body. At the end of 5 years, he had earned fellowships at the Trinity College of Cambridge and the Royal Society, but lost his health. Reluctantly, he decided to return to Madras in 1919. In all this time, Ramanujan wrote letters to Janaki, but she never got to see most of them. For reasons best known to her, Ramanujan's mother hid these letters from Janaki. She even hid his letter announcing the date of his return to India, so Janaki did not go to receive him.

Once home, he continued to nurture ambitions of returning to England after he recovered. He told Janaki that he would buy her diamond earrings and that she did not have to live in poverty ever again. During this time, they got very little help from their own relatives because no one wanted to associate with a man who had broken the taboo. Janaki continued to tenderly nurse Ramanujam, hoping he would turn around. Ramanujan was overwhelmed and told her that if she had only accompanied him to England, things would not have become so dire.

Deep inside, Ramanujan knew that his life was rapidly fading away. He feverishly worked on his last theorems from his bed. Janaki did not complain because at last, she had Ramanujan all to herself. But it was too good to last. Within a year Ramanujan died. His relatives boycotted the funeral and did not support Janaki.

But this determined woman was not ready to give up. Janaki, barely 22, went to live with her brother in Bombay (Mumbai). There she educated herself in English and tailoring. Not wanting to be a burden, she returned to Madras and settled in Triplicane – the same neighbourhood where she and Ramanujan had started life together. She opened a tailoring school and shop to supplement the small pension she received from Madras University. Though the income was small, she was in charge of her own life. She had the respect and support of the small local community. Then came a tragedy which became a life defining moment.

One of her close friends in Triplicane was a single mother named Soundaravalli. She died suddenly in 1950, leaving an orphan son, Narayanan, who was just 7 years old. Janaki made a bold decision: she adopted Narayanan. Even though she was already 50 years old, she decided to take the plunge. She educated Narayanan until he got a job in a reputed Bank. In 1972 she conducted his wedding with Vaidehi, a girl from the same bank.

Unlike in her own marriage, she encouraged her son and daughter-in-law to move into a house nearby. She loved them but did not want to stifle their independence. She knew from her own experience that youngsters needed space! Janaki continued her independent life, living frugally and spending her savings by paying school fees for poor students. Some children would ask her for a small part of their examination fees, because her blessing was considered auspicious! When she was nearly 90, she retired and moved under the loving care of the grateful Narayanans. She had always been a giver who found joy in giving. Now it was her turn to receive.

She passed away peacefully in 1994, aged 95 years. She was just 5 years short of 100. But 100 was a mere number.

Janaki had transcended infinity!


Watch the "Untold Story of Ramanujan's Wife"

https://www.youtube.com/watch?v=xkKJ6qYgS5s&ab_channel=Mathopia

**Ramanujan with Janaki**
**In 1909, Ramanujan was married to a 9-year-old child bride,**
**S Janaki Ammal.**

**Janakiammal Ramanujan 1987 Channel 4 "Equinox" Interview**

**Visit to watch 'The Interview'**

https://www.youtube.com/watch?v=1qaRtMjTD-k&ab_channel=Kasturi

(☺)@@@@@@@@@@@@@@@@@@@@(☺)

# The Man Who Knew Infinity


**Visit to watch the Film**: The Man Who Knew Infinity

https://www.imdb.com/title/tt0787524/

Ramanujan's Three Notebooks

1. Ramanujan's mother: Komalatammal

2. Goddess Namagiri, deity at Namakkal

3. Srinivasa Ramanujan's passport photograph (1919)

4. Town High School, Kumbakonam, where Ramanujan studied from 1898 to 1903.


International Monument @
SASTRA Deemed University

PAGE on Srinivasa Ramanujan in
The Institute of Mathematical Sciences, Madras.

# Srinivasa Ramanujan

---

**Born: 22 Dec 1887 in Erode, Tamil Nadu state, India**
**Died: 26 April 1920 in Madras, Tamil Nadu state, India**

**Ramanujan** was one of India's greatest mathematical geniuses. He made substantial contributions to the analytical theory of numbers and worked on elliptic functions, continued fractions, and infinite series.

**********

## Srinivasa Ramanujan

(Dec. 22, 1887 -- April 26, 1920)


## K. Srinivasa Rao

***The Institute of Mathematical Sciences, Madras-600 113.***


Srinivasa Ramanujan (1887-1920) hailed as an all-time great mathematician, like Euler, Gauss or Jacobi, for his *natural genius*, has left behind 4000 original theorems, despite his lack of formal education and a short life-span. In his formative years, after having failed in his F.A. (First examination in Arts) class at College, he ran from pillar to post in search of a benefactor. It is during this period, 1903-1914, he kept a record of the final results of his original research work in the form of entries in two

large-sized Note Books. These were the ones which he showed to Dewan Bahadur Ramachandra Rao (Collector of Nellore), V. Ramaswamy Iyer (Founder of Indian Mathematical Society), R. Narayana Iyer (Treasurer of IMS and Manager, Madras Port Trust), and to several others to convince them of his abilities as a Mathematician. The orchestrated efforts of his admirers, culminated in the encouragement he received from Prof. G.H. Hardy of Trinity College, Cambridge, whose warm response to the historic letter of Ramanujan which contained about 100 theorems, resulted in inducing the Madras University, to its lasting credit, to rise to the occasion thrice - in offering him the first research scholarship of the University in May 1913 ; then in offering him a scholarship of 250 pounds a year for five years with 100 pounds for passage by ship and for initial outfit to go to England in 1914 ; and finally, by granting Ramanujan 250 pounds a year as an allowance for 5 years commencing from April 1919 soon after his triumphant return from Cambridge ``with a scientific standing and reputation such as no Indian has enjoyed before".

Ramanujan was awarded in 1916 the B.A. Degree by research of the Cambridge University. He was elected a Fellow of the Royal Society of London in Feb. 1918 being a ``Research student in Mathematics Distinguished as a pure mathematician particularly for his investigations in elliptic functions and the theory of numbers" and he was elected to a Trinity College Fellowship, in Oct. 1918 (- a prize fellowship worth 250 pounds a year for six years with no duties or condition, which he was not destined to avail of). The ``Collected Papers of Ramanujan" was edited by Profs. G.H.Hardy, P.V. Seshu Aiyar and B.M. Wilson and first published by Cambridge University Press in 1927 (later by Chelsea, 1962 ; and by Narosa, 1987), seven years after his death. His `Lost' Notebook found in the estate of Prof. G.N. Watson in the spring of 1976 by Prof. George Andrews of Pennsylvania State University, and its facsimile edition was brought out by Narosa Publishing House in 1987, on the occasion of Ramanujan's birth centenary. His bust was commissioned by Professors R. Askey, S. Chandrasekhar, G.E. Andrews, Bruce C. Berndt (`the gang of four'!) and `more than one hundred mathematicians and scientists who contributed money for the bust' sculpted by Paul Granlund in 1984 and another was commissioned for the Ramanujan Institute of the University

of Madras, by Mr. Masilamani in 1994. His original Note Books have been edited in a series of five volumes by Bruce C. Berndt (``Ramanujan Note Books", Springer, Parts I to V, 1985 onwards), who devoted his attention to each and every one of the three to four thousand theorems. Robert Kanigel recently wrote a delightfully readable biography entitled : ``The Man who knew Infinity : a life of the Genius Ramanujan" (Scribners 1991; Rupa & Co. 1993). Truly, the life of Ramanujan in the words of C.P. Snow: ``is an admirable story and one which showers credit on nearly everyone".

During his five year stay in Cambridge, which unfortunately overlapped with the first World War years, he published 21 papers, five of which were in collaboration with Prof. G.H. Hardy and these as well as his earlier publications before he set sail to England are all contained in the ``Collected Papers of Srinivasa Ramanujan", referred earlier. It is important to note that though Ramanujan took his ``Note Books" with him he had no time to delve deep into them. The 600 formulae he jotted down on loose sheets of paper during the one year he was in India, after his meritorious stay at Cambridge, are the contents of the `Lost' Note Book found by Andrews in 1976. He was ailing throughout that one year after his return from England (March 1919 - April 26, 1920). The last and only letter he wrote to Hardy, from India, after his return, in Jan. 1920, four months before his demise, contained no news about his declining health but only information about his latest work : ``I discovered very interesting functions recently which I call `Mock' theta-functions. Unlike the `False' theta-functions (studied partially by Prof. Rogers in his interesting paper) they enter into mathematics as beautifully as ordinary theta-functions. I am sending you with this letter some examples ... ". The following observation of Richard Askey is noteworthy: ``Try to imagine the quality of Ramanujan's mind, one which drove him to work unceasingly while deathly ill, and one great enough to grow deeper while his body became weaker. I stand in awe of his accomplishments; understanding is beyond me. We would admire any mathematician whose life's work was half of what Ramanujan found in the last year of his life while he was dying".

As for his place in the world of Mathematics, we quote Bruce C Berndt: ``Paul Erdos has passed on to us Hardy's personal ratings of mathematicians. Suppose that we rate mathematicians on the basis of pure talent on a scale from 0 to 100, Hardy gave himself a score of 25, Littlewood 30, Hilbert 80 and Ramanujan 100". G.H.Hardy, in 1923, edited Chapter XII of Ramanujan's second Notebook on Hypergeometric series which contained 47 main theorems, many of them followed by a number of corollaries and particular cases. This work had taken him so many weeks that he felt that if he were to edit the entire Notebooks ``it will take the whole of my lifetime. I cannot do my own work. This would not be proper." He urged Indian authorities and G.N.Watson and B.M. Wilson to edit the Notebooks. Watson and Wilson divided the task of editing the Notebooks - Chapters 2 to 13 were to be edited by Wilson and Chapters 14 to 21 by Watson. Unfortunately, the premature death of Wilson, in 1935, at the age of 38, aborted this effort. In 1957, with monetary assistance from Sir Dadabai Naoroji Trust, at the instance of Professors Homi J Bhabha and K. Chandrasekaran, the Tata institute of Fundamental Research published a facsimile edition of the Notebooks of Ramanujan in two volumes, with just an introductory para about them. The formidable task of truly editing the Notebooks was taken up in right earnest by Professor Bruce C. Berndt of the University of Illinois, in May 1977 and his dedicated efforts for nearly two decades has resulted in the *Ramanujan's Notebooks* published by Springer-Verlag in five Parts, the first of which appeared in 1985. The three original Ramanujan Notebooks are with the Library of the University of Madras, some of the correspondence, papers/letters on or about Ramanujan are with the National Archives at New Delhi and the Tamil Nadu Archives, and a large number of his letters and connected papers/correspondence and notes by Hardy, Watson, Wilson are with the Wren Library of Trinity College, Cambridge. ``Ramanujan : Letters and Commentary", by Bruce C. Berndt and Robert A. Rankin (published jointly by the American Mathematical Society and London Math. Society, 1995) is a recent publication. The Ramanujan Institute for Advanced Study in Mathematics of the University of Madras is situated at a short distance from the famed Marina Beach and is close to the Administrative Buildings of the University and its Library. The bust of Ramanujan made by Mr. Masilamani is housed in the Ramanujan

Institute. In 1992, the Ramanujan Museum was started in the Avvai Kalai Kazhagam in Royapuram. Mrs. Janakiammal Ramanujan, the widow of Ramanujan, lived for several decades in Triplicane, close to the University's Marina Campus and died on April 13, 1994. A bust of Ramanujan, sculpted by Paul Granlund was presented to her and it is now with her adopted son Mr. W. Narayanan, living in Triplicane.

**References:**


1. *Dictionary of Scientific Biography*
2. Biography in *Encyclopaedia Britannica*
3. G H Hardy, *Ramanujan* (Cambridge, 1940).
4. R A Rankin, Ramanujan's manuscripts and notebooks, *Bull. London Math. Soc.* **14** (1982), 81-97.
5. R A Rankin, Ramanujan's manuscripts and notebooks II, *Bull. London Math. Soc.* **21** (1989), 351-365.
6. R Kanigel, *The man who knew infinity : A life of the genius Ramanujan* (New York, 1991).
7. B Berndt, Srinivasa Ramanujan, *The American Scholar* **58** (1989), 234-244.
8. B Berndt and S Bhargava, Ramanujan - For lowbrows, *Amer. Math. Monthly* **100** (1993), 644-656.
9. J M Borwein and P B Borwein, Ramanujan and pi, *Scientific American* **258** (2) (1988), 66-73.
10. S R Ranganathan, *Ramanujan : the man and the mathematician* (London, 1967).
11. S Ram, *Srinivasa Ramanujan* (New Delhi, 1979).
12. L Debnath, Srinivasa Ramanujan (1887-1920) : a centennial tribute, *International journal of mathematical education in science and technology* **18** (1987), 821-861.
13. R A Rankin, Srinivasa Ramanujan (1887- 1920), *International journal of mathematical education in science and technology* **18** (1987), 861- .
14. K. Srinivasa Rao, *Srinivasa Ramanujan: a Mathematical Genius* (EastWest Books (Madras) Pvt. Ltd., 1998).


Ramanujan Museum, Chennai

# Ramanujan's Birthday Magic Square

One of the world's most talented mathematicians, Srinivasa Ramanujan (1887–1920), was born on 22nd December 1887. Some of Ramanujan's work on recreational mathematics and magic squares can be found in his early notebooks. A magic square is an NxN matrix in which every row, column, and diagonal sums up to the same number. The sum is called the magic constant or magic sum of the magic square. Ramanujan created the following birthday magic square from his date of birth (in DD MM YYYY format) where all four rows, four columns and two diagonals sum up to 139.

$$\begin{bmatrix} 22 & 12 & 18 & 87 \\ 88 & 17 & 09 & 25 \\ 10 & 24 & 89 & 16 \\ 19 & 86 & 23 & 11 \end{bmatrix}$$

Ramanujan's Birthday Magic Square

e.g. sum of **all rows** equals to 139.

22 + 12 + 18 + 87 = 139; 88 + 17+ 09 + 25 = 139; 10 + 24 + 89 + 16 = 139; 19 + 86 + 23 + 11 = 139

sum of **all columns** equals to 139

22 + 88 + 10 + 19 = 139; 12 + 17 + 24 + 86 = 139; 8 + 09 + 89 + 23 = 139; 87 + 25 + 16 + 11 = 139

sum of **two diagonals** equals to 139 as well

22 + 17 + 89 + 11 = 139; 19 + 24 + 09 + 87 = 139

In addition, the **2x2 matrices in all four corners** also sum up to 139

22 + 12 + 88 + 17 = 139; 18 + 87 + 09 + 25 =139;

10 + 24 + 19 + 86 = 139; 89 + 16 + 23+ 11=139;

**sum of all the corner digits** and **central 2x2 matrix** is also 139.

22 + 87 + 19 + 11 =139; 17 + 09 + 24 + 89 =139;

That seems like magic and hence the name — magic square. As depicted in the figure 1, there are different types of magic squares. Ramanujan's birthday magic square is a complete magic square. Magic squares are not purely recreational, it has applications in Birkhoff — von Neumann decomposition, Quantum permutation matrices etc.

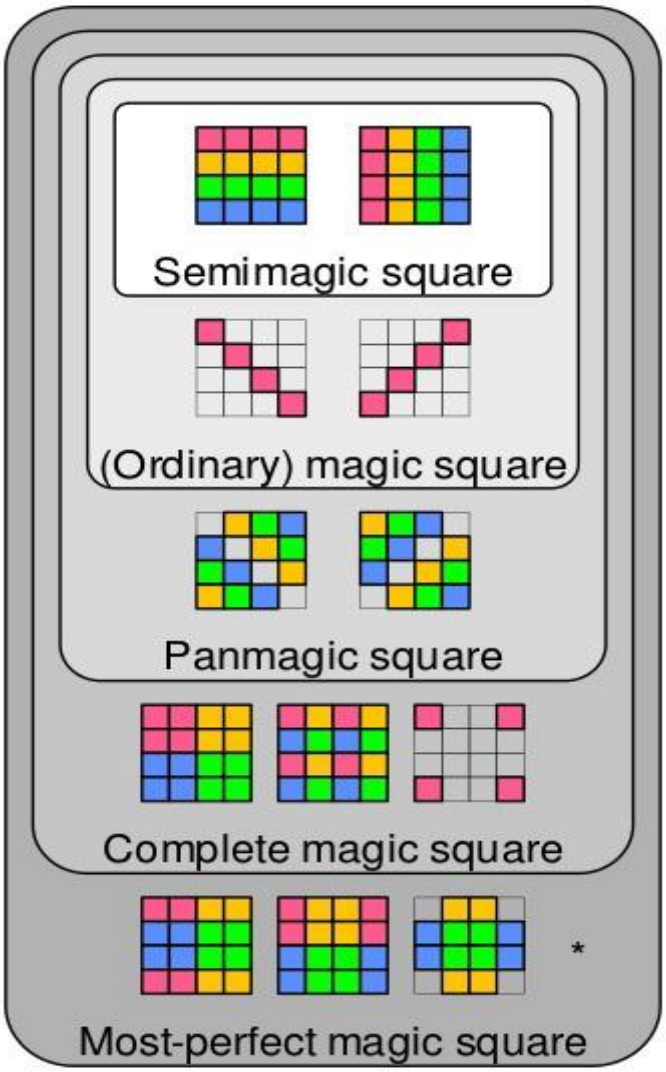


Figure -1 Euler diagram of requirements of some types of 4 x 4 magic squares. Cells of the same color sum to the magic constant.

But how do we construct birthday magic square(s)? If we inspect the matrix closely, we will notice there is a structure in it. If we denote: a = two digits date, b = two digits month, c = first two digits of year, d = last two digits of the year, in other words a=22, b=12, c=18, d=87.

the structure is …

$$\begin{bmatrix} a & b & c & d \\ (d+1) & (c-1) & (b-3) & (a+3) \\ (b-2) & (a+2) & (d+2) & (c-2) \\ (c+1) & (d-1) & (a+1) & (b-1) \end{bmatrix}$$

**********

You can create a "Magic Square" from your date of birth.

## Watch the following Video

**Magic Square from your DATE OF BIRTH**
**Ramanujan's Magic**

https://www.youtube.com/watch?v=XAGUodW48fE&ab_channel=SureshAggarwal

**Try and enjoy!**

# Srinivasa Ramanujan Centre

## Kumbakonam

SASTRA's off campus centre at Kumbakonam known as Srinivasa Ramanujan Centre (SRC) is a fitting tribute to the great Mathematician, Srinivasa Ramanujan, who spent most of his formative years in this temple town of Kumbakonam. Kumbakonam gets its name from the presiding deity Lord Aadhi Kumbeshwarar. The cradle of South Indian Culture, the town is known for its temples, intricately carved panchaloha idols, exquisite brasswares especially lamps, silk and betel leaves. The place, like many other sacred places spread across the country, is known for the Mahamaham festival. The festival celebrated once in twelve years coincides with the entry of Sun and Jupiter into constellation of Aquarius and Leo respectively. People from all walks of life have a dip in the Mahamaham tank along with the presiding deities of the town. This occasion is said to absolve the people of their sins.

Many intellectuals, musicians, sthapathis (people well-versed in design and construction of temples and carving of idols) and silk weavers hail from in and around Kumbakonam. Located on the banks of river Cauvery, this place can be reached from Chennai, either by rail or by road in about six hours.

## SASTRA

The dreams of its founding fathers took shape in 1984 in the form of Shanmugha College of Engineering, which is now renamed, SHANMUGHA ARTS, SCIENCE, TECHNOLOGY & RESEARCH ACADEMY (SASTRA). Our programmes, infrastructure, teaching-learning, etc., are among the country's finest. SASTRA has always been proactive in its academic planning and believes in gaining the first-mover advantage. As a testimony to this, the Government of India has conferred the University status to SASTRA on April 26, 2001 under section 3 of the UGC Act, 1956.

SASTRA offers various undergraduate and post graduate courses in Engineering, Science, Education, Management, Law and Arts besides various Doctoral programmes and has state-of-the-art laboratories, a well-stocked library and one of the best computing facilities. With a sprawling campus having a built-up area of 2,22,129.02

square metre spread over 232 acres and a vibrant population of over 10,000 students and over 700 teaching faculty have made SASTRA a landmark in the educational map of India.

With an ideal teacher-taught ratio, we strive for academic excellence through personalized attention. The mechanisms established to support and monitor the student's progress assure success and satisfaction. Since its inception SASTRA has achieved national standing in terms of academic performance, co-curricular and extra-curricular activities and also in its growth and commitment to social service.

The standards of excellence of our programmes are reflected in the grades awarded to us by the National Assessment and Accreditation Council and in the success of our students in industry and academia, both in India & abroad. SASTRA has also been re-accredited with Grade 'A' (maximum) by the National Accreditation and Assessment Council (NAAC) a statutory body of U.G.C.

SASTRA shapes its students' future by fostering a teamwork approach to instruction, encouraging interaction with faculty, providing access to high tech information, motivating them to develop new ideas and concepts, taking personal interest in students' career development and preparing them for success.

## SRC

Srinivasa Ramanujan Centre (SRC), Kumbakonam, was inaugurated, in November 2000, by Prof. .S. Ramamurthy, Secretary, Department of Science and Technology, Government of India with the following objectives:

To establish a national monument for Srinivasa Ramanujan

- To provide quality higher education to the people of Kumbakonam and nearby places
- To offer degree programmes
- To coach +2 students for professional courses

The activities of the Srinivasa Ramanujan Centre have been expanded with SASTRA acquiring 10 acres of land in Lakshmivilas Agraharam and constructing a massive six storied structure encompassing an area of 1,52,523 sq.ft. Situated in the heart of the

town, this building houses modern class rooms, state-of-the-art Computer laboratory, Electrical Machines laboratory, Electronics and Communications laboratory, Physics laboratory, Chemistry and Biochemistry laboratory, Mechanical Workshops and a 300 - seater airconditioned auditorium. A library with over 21,000 books and more than 145 print journals in addition to a free 2Mbps Internet access caters to the requirements of students and staff members. House of Ramanujan Mathematics, a museum on life and works of the Mathematical prodigy, Srinivasa Ramanujan, also exists on this campus. SRC has been dedicated to the Nation by His Excellency Dr. A.P.J. Abdul Kalam, President of India.

Based on the recommendations of a high-level committee appointed by the University Grants Commission (UGC), Government of India, **Srinivasa Ramanujan Centre,** established by SASTRA has been declared as an OFF-CAMPUS CENTRE under the ambit of SASTRA University.

## Major Activities

- ✓ SASTRA purchased the house where Srinivasa Ramanujan lived at Kumabakonam and renovated it. The President of India, His Excellency Dr. A.P.J. Abdul Kalam has since declared it as an international Monument.
- ✓ The President dedicated the House of Ramanujan Mathematics, a museum containing life and works of the prodigy to the Nation.
- ✓ SASTRA organizes an International Conference, every year, in honour of Srinivasa Ramanujan on various focal themes.
- ✓ SASTRA organizes Srinivasa Ramanujan Birth Anniversary Commemorative lecture every year on Dec 22, 2012.
- ✓ SASTRA has instituted an annual award of US$ 10,000/- and a citation to be presented for outstanding research in the areas influenced by Srinivasa Ramanujan. The award is open to researchers all over the world under the age of 32. This award has been instituted with a view to encourage young minds to pursue cutting edge research in mathematical applications

influenced by Ramanujan and increase the visibility of mathematics both at the national and global level.

## SASTRA-Ramanujan Conference

- The Seventeenth International conference on Number Theory was held on December 21 & 22, 2019. Prof. Ken Ono, University of Virginia, USA, inaugurated the conference.
- The Sixteenth International conference on Srinivasa Ramanujan was held on December 21 & 22, 2018. Dr. C. Velan, Executive Director & CEO, Ramanujan IT City, Tata Realty Infopark, Ltd., inaugurated the conference.
- The Fifteenth international conference on Number Theory was held on December 21 & 22, 2017. Mr. Badrinarayanan Parthasarathy Vice-president, Networks & Services Engineering, Tata Communications, inaugurated the conference.
- The Fourteenth international conference on Number Theory was held on December 21 & 22, 2016. Prof. Henri Darmon, Department of Mathematics, McGill University, Canada, inaugurated the conference.
- The Thirteenth international conference on Number Theory and Algebraic Geometry was held on December 21 & 22, 2015. Prof. G. Rangarajan, Department of Mathematics and Chairman, Division of Interdisciplinary Research, IISc., Banglore, inaugurated the conference.
- The Twelfth international conference on Number Theory was held on December 21 & 22, 2014. Dr. Mangalam Srinivasan, Former Advisory, Research and Teaching appointee at the faculty of Arts and Sciences, Special Advisor, Kennedy School of Government and Fellow of CFTA, Harvard University inaugurated the conference.
- The Eleventh international conference on Number Theory and Galois Representations was held on December 21 & 22, 2013. Prof. Michael Rapoport, Mathematisches Institut, Uuniversity of Bonn, Germanay, inaugurated the conference.
- The Tenth international conference on Legacy of Srinivasa Ramanujan was held on December 14 & 15, 2012 at Srinivasa Ramanujan Centre, Kumbakonam. Dr. Rajiv Sharma, Executive Director, Indo-US Science and Technology Forum, New Delhi, inaugurated the conference.
- The Nineth conference on "Number Theory and Automorphic Forms" was held on December 22, 2011. Conference Topic : Ergodic Theory and Dynamics.
- The Eighth conference on "Number Theory and Automorphic Forms" was held on December 22, 2010 inaugurated by Prof. Lakshmi Narayanan,

Senior Professor, Raman Research Institute, Bangalore. Topic : Number Theory and Automorpic Forms.

- The Seventh conference on "Number Theory and Mock Theta Function" was held on December 22, 2009 inaugurated by Prof. M. Vijayan, Honorary Professor, IISC Bangalore. Topic : Number Theory and Mock Theta Function.
- The Sixth conference on "Number Theory and Modular Forms" was held from December 20 to 22, 2008 inaugurated by Dr. Krishna N Ganesh, Director IISER Pune & J C Bose Fellow(DST), NCL Pune. Conference Topic : Number Theory and Modular Forms.
- The Fifth conference on "Number Theory, Theoretical Physics and Special functions" was held from December 20 to 22, 2007 inaugurated by Prof. Michel Waldschmidt. Conference Topic : Theoritical Physics and Special Functions.
- The Fourth conference was held from December 19 to 22, 2006 on "Number Theory and Combinatorics" was inaugurated by Shri. S. Sathyam, IAS(Retd), MHRD, Delhi. Conference Topic : Number Theory & Combinatorics.
- The Third in the series on "Number Theory and Mathematical Physics" was inaugurated by Dr. Arabinda Mitra, Executive Director, INDO-US Science and Technology Forum, New Delhi, on December 20, 2005. Conference Topic : International Conference on Number Theory & Mathematical Physics.
- The Second conference on "Number Theory and Fourier Techniques" was inaugurated by Dr. Alladi Krishnaswamy, Professor and Chair, Department of Mathematics, University of Florida, on 20th December 2004. Conference Topic : Number Theory and Fourier Techniques.
- The First conference on "Number Theory for Secure Communications" was organized on 20th December 2003. It was inaugurated by His Excellency, Dr. A.P.J. Abdul Kalam, President of India. Conference Topic : International Conference on Number Theory for Secure Communications.

## SASTRA Ramanujan Award

SASTRA has instituted an annual award of US$ 10,000/- and a citation to be presented for outstanding research in the areas influenced by Srinivasa Ramanujan. The award is open to researchers all over the world under the age of 32. This award has been instituted with a view to encourage young minds to pursue cutting edge research in mathematical applications influenced by Ramanujan and increase the visibility of mathematics both at the national and global level.

Yunqing Tang receives the Award for 2022

- The SASTRA Ramanujan Prize for **2022** was awarded to Yunqing Tang Assistant Professor at the University of California, Berkeley, USA.
- The **2021** SASTRA Ramanujan Prize was awarded to Dr. Will Sawin of Columbia University for his many path-breaking contributions at the interface of number theory and algebraic geometry utilizing a variety of powerful methods from different areas of mathematics.
- Sastra University (Deemed) has awarded the **2020** Sastra Ramanujan prize to Dr. SHAI EVRA of Princeton University, USA, and the Hebrew University of Jerusalem, Israel.
- The SASTRA Ramanujan prize for **2019** was awarded to mathematician Dr.Adam Harper, Assistant Professor with the University of Warwick, England.
- The **2018** SASTRA Ramanujan Prize was jointly awarded to Professors YIFENG LIU (Yale University, USA) and Jack Thorne (Cambridge University, England).
- Maryna Viazovska of Swiss Federal Institute of Technology, Lausanne, Switzerland, has received **2017** SASTRA Ramanujan Prize for her contribution to number theory.
- The **2016** SASTRA Ramanujan prize, for outstanding contributions by young mathematicians to areas influenced by the genius Srinivasa Ramanujan, was jointly awarded to Kaisa Matomaki of University of Turku, Finland and Maksym Radziwill of McGill University, Canada.
- The **2015** SASTRA Ramanujan Prize was awarded to Dr. Jacob Tsimerman of the University of Toronto, Canada.
- The **2014** SASTRA Ramanujan Prize was awarded to Dr. James Maynard of Oxford University, England, and the University of Montreal, Canada.
- The **2013** SASTRA Ramanujan Prize was awarded to Professor Peter Scholze of the University of Bonn, Germany.

- The **2012** SASTRA Ramanujan Prize was awarded to Professor Zhiwei Yun, who has just completed a C. L. E. Moore Instructorship at the Massachusetts Institute of Technology and is taking up a faculty position at Stanford University in California this fall.
- The **2011** SASTRA Ramanujan Prize was awarded to Roman Holowinsky, who is now an Assistant Professor at the Department of Mathematics, Ohio State University, Columbus, Ohio, USA.
- The **2010** SASTRA Ramanujan Prize was awarded to Wei Zhang, who is now a Benjamin Pierce Instructor at the Department of Mathematics, Harvard University, USA.
- The **2009** SASTRA Ramanujan Prize will be awarded to Professor KATHRIN BRINGMANN of the University of Cologne, Germany and the University of Minnesota, USA.
- The **2008** SASTRA Ramanujan Prize will be awarded to Akshay Venkatesh, who is now Professor of Mathematics at Stanford University, USA.
- The **2007** SASTRA Ramanujan Prize will be awarded to Ben Green, who is Hershel Smith Professor of Mathematics at Cambridge University, England.
- The **2006** SASTRA Ramanujan Prize will be awarded to Professor Terence Tao of the University of California at Los Angeles (UCLA).
- The **2005** SASTRA Ramanujan Prize will be jointly awarded to Professors MANJUL BHARGAVA (Princeton University) and KANNAN SOUNDARARAJAN (University of Michigan).


**Prof Manjul Bhargava and Prof Kannan Soundararajan receive the Award for 2005**

# 10 MAJOR CONTRIBUTIONS AND ACHIEVEMENTS

Srinivasa Ramanujan FRS (1887 – 1920) was a self-taught Indian mathematical genius who made numerous contributions in several mathematical fields including mathematical analysis, infinite series, continued fractions, number theory and game theory. Ramanujan provided solutions to mathematical problems that were then considered unsolvable. Moreover, some of his work was so ahead of his time that mathematicians are still understanding its relevance. In 1914, Ramanujan found a formula for computing π (pi) that is currently the basis for the fastest algorithms used to calculate π. The circle method, which he developed with G. H. Hardy, constitute a large area of current mathematical research. Moreover, Ramanujan discovered K3 surfaces which play key roles today in string theory and quantum physics; while his mock modular forms are being used in an effort to unlock the secret of black holes. Know more about the achievements of Srinivasa Ramanujan through his 10 major contributions to mathematics.

**********

## #1 HE WAS THE SECOND INDIAN TO BE ELECTED A FELLOW OF THE ROYAL SOCIETY

A self-taught genius, Ramanujan moved to England in *March 1914* after his talent was recognized by *British mathematician G. H. Hardy*. In 1916, Ramanujan was awarded a *Bachelor of Science by Research* degree (later named Ph.D.) by *Cambridge* even though he was not an undergraduate. The Ph.D. was awarded in recognition of his work on *'Highly composite numbers'*. In 1918, Ramanujan became *one of the youngest Fellows of the Royal Society* and only the *second Indian member*. The same year he was elected a *Fellow of Trinity College, Cambridge*, the *first Indian to be so honored*. During his short lifespan of 32 years, Ramanujan *independently compiled around 3,900 results*. Apart from the

below mentioned achievements his contributions include developing the relationship between *partial sums* and *hyper-geometric series*; independently discovering *Bernoulli numbers* and using these numbers to formulated *the value of Euler's constant up to 15 decimal places*; discovering the *Ramanujan prime number* and the *Landau–Ramanujan constant*; and coming up with *Ramanujan's sum* and the *Ramanujan's master theorem.*

## #2 THE FASTEST ALGORITHMS FOR CALCULATION OF PI ARE BASED ON HIS SERIES

*Finding an accurate approximation of π (pi) has been one of the most important challenges in the history of mathematics. In 1914, Srinivasa Ramanujan found a formula for computing pi that converges rapidly. His formula computes a further eight decimal places of π with each term in the series. It was in 1989, that Chudnovsky brothers computed π to over 1 billion decimal places on a supercomputer using a variation of Ramanujan's infinite series of π. This was a world record for computing the most digits of pi. Moreover, the Ramanujan series is currently the basis for the fastest algorithms used to calculate π.*

For estimating $\pi$

$$\frac{1}{\pi} = \frac{2\sqrt{2}}{9801} \sum_{k=0}^{\infty} \frac{(4k)!(1103 + 26390k)}{(k!)^4 396^{4k}}$$

Ramanujan formula for estimating the value of Pi

## #3 THE RAMANUJAN CONJECTURE PLAYED A KEY ROLE IN THE FAMOUS LANGLANDS PROGRAM

*In 1916, Ramanujan published his paper titled "On certain arithmetical functions". In the paper, Ramanujan investigated the properties of Fourier coefficients of modular forms. Though the theory of modular forms was not even developed then, he came up with three fundamental conjectures that served as a guiding force for its development. His first two conjectures helped develop the Hecke theory, which was formulated 20 years after his paper, in 1936, by German mathematician Erich Hecke. However, it was his last conjecture, known as the Ramanujan conjecture, that created a sensation in in 20th century mathematics. It played a pivotal role in the Langlands program, which began in 1970 through the proposal of American-Canadian mathematician Robert Langlands. The Langlands program aims to relate representation theory and algebraic number theory, two seemingly different fields of mathematics. It is widely viewed as the single biggest project in modern mathematical research. "On certain arithmetical functions" by Ramanujan thus effectively changed the course of 20th century mathematics.*

## #4 HE DEVELOPED THE INFLUENTIAL CIRCLE METHOD IN PARTITION NUMBER THEORY

*A partition for a positive integer n is the number of ways the integer can be expressed as a sum of positive integers. For example p(4) = 5. That means 4 can be expressed as a sum of positive integers in 5 ways: 4, 3+1, 2+2, 2+1+1 and 1+1+1 +1. Ramanujan, along with G. H. Hardy, invented the circle method which gave the first approximations of the partition of numbers beyond 200. This method was largely responsible for major advances in the 20th century of notoriously difficult problems such as Waring's conjecture and other additive questions. The circle method is now one of the central tools of analytic number theory. Moreover, circle method and its refinements constitute a large area of current mathematical research.*

## #5 HE DISCOVERED THE THREE RAMANUJAN'S CONGRUENCES

*Related to the Partition Theory of Numbers, Ramanujan also came up with three remarkable congruences for the partition function p(n). They are p(5n+4) = 0(mod 5); p(7n+4) = 0(mod 7); p(11n+6) = 0(mod 11). For example, the first congruence means that if an integer is 4 more than a multiple of 5, then number of its partitions is a multiple of 5. The study of Ramanujan type congruence is a popular research topic of number theory. It was in 2011, that a conceptual explanation for Ramanujan's congruences was finally discovered. Ramanujan's work on partition theory has applications in a number of areas including particle physics (particularly quantum field theory) and probability.*

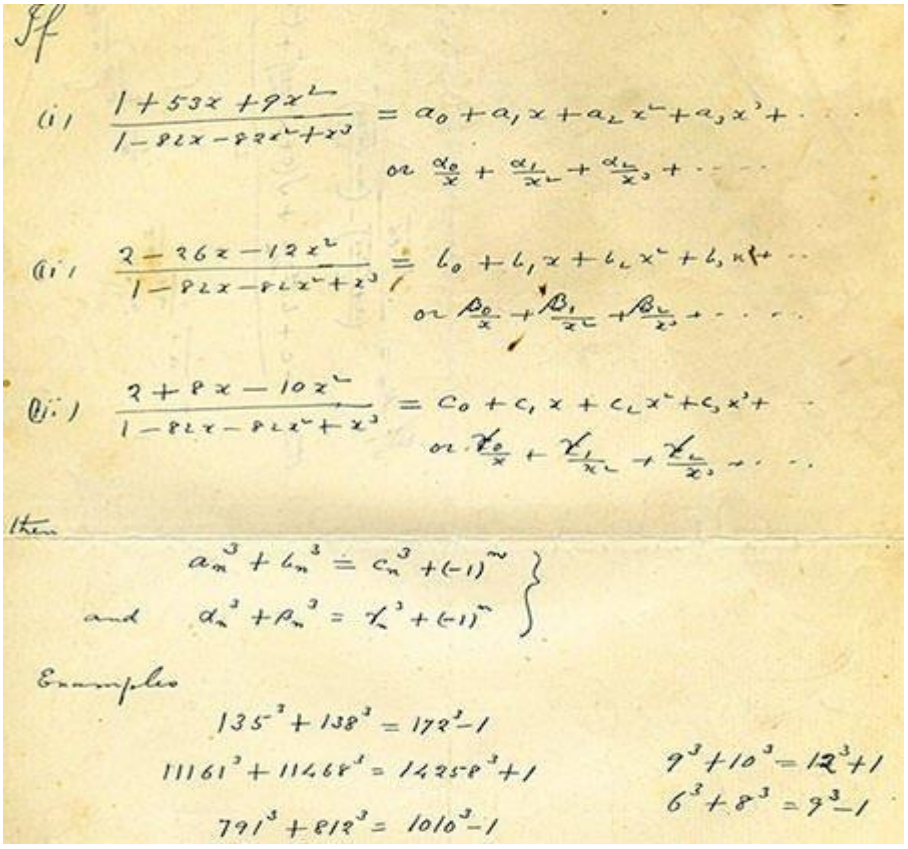
$$p(5k+4) = 0 \pmod 5$$
$$p(7k+5) = 0 \pmod 7$$
$$p(11k+6) = 0 \pmod{11}$$

## #6 NUMBER 1729 IS NAMED HARDY-RAMANUJAN NUMBER

*In a famous incident British mathematician G. H. Hardy while visiting Ramanujan had ridden in a taxi cab with the number 1729. He remarked to Ramanujan that the number "seemed to me rather a dull one, and that I hoped it was not an unfavourable omen". "No," Ramanajun replied, "it is a very interesting number; it is the smallest number expressible as the sum of two cubes in two different ways." The two different ways are: $1729 = 1^3 + 12^3 = 9^3 + 10^3$. 1729 is now known as the Hardy–Ramanujan number. Moreover, numbers that are the smallest number that can be expressed as the sum of two cubes in n distinct ways are now referred to as taxicab numbers due to the incident. The relevance of 1729 has recently come to light as it was part of a much larger theory that Ramanujan was developing. Theorems have been established in theory of elliptic curves that involve this fascinating number.*

## #7 HE DID GROUNDBREAKING RESEARCH RELATED TO FERMAT'S LAST THEOREM

*In 2013 famous Japanese American Mathematician Ken Ono, along with Sarah Trebat-Leder, found an equation by Ramanujan had clearly showed that he had been working on Fermat's last theorem, one of the most notable and difficult to prove theorems in the history of mathematics. In 1637, French mathematician Pierre de Fermat had asserted that: if n is a whole number greater than 2, then there are no positive whole number triples x, y and z, such that $x^n + y^n = z^n$. This means that there are no numbers which satisfy the equations: $x^3 + y^3 = z^3$; $x^4 + y^4 = z^4$; and so on. The equation of Ramanujan illustrates that he had found an infinite family of positive whole number triples x, y and z that very nearly, but not quite, satisfy Fermat's equation for n=3. They are off only by plus or minus one. Among them is 1729, which misses the mark by 1 for x=9, y=10 and z=12. Moving forward, Ramanujan also considered the equations of the form: $y^2 = x^3 + ax + b$. If you plot the points (x,y) for this equation you get an elliptic curve. Elliptic curves played a key role when English mathematician Sir Andrew Wiles finally proved Fermat's last theorem in 1994, a feat described as a "stunning advance" in maths.*



## #8 RAMANUJAN WAS THE FIRST TO DISCOVER K3 SURFACES IN 1910S

*Ken Ono also found that Ramanujan went on to discover an object more complicated than elliptic curves. When it was re-discovered in 1958 by Andre Weil, it was named K3 surface. Thus it has come to light that Ramanujan was using 1729 and elliptic curves to develop formulas for a K3 surface. "Elliptic curves and K3 surfaces form an important next frontier in mathematics and Ramanujan gave remarkable examples illustrating some of their features that we didn't know before." Moreover, K3 surfaces play key roles today in string theory and quantum physics. Like, string theory suggests that the world consists of more than the three dimensions that we can see. These extra dimensions are rolled up tightly in tiny little spaces too small for us to perceive. These tiny spaces have a particular geometric structure. Calabi–Yau manifold is a class of geometric objects that have similar structure and one of the simplest classes of Calabi-Yau manifolds comes from K3 surfaces.*

## #9 HIS THETA FUNCTION LIES AT THE HEART OF STRING THEORY IN PHYSICS

*In mathematics, theta functions are special functions of several complex variables. German Mathematician Carl Gustav Jacob Jacobi came up with several closely related theta functions known as Jacobi theta functions. Theta functions were studied extensively by Ramanujan. He came up with the Ramanujan theta function, which generalizes the form of Jacobi theta functions while also capturing their general properties. In particular, the Jacobi triple product takes on an elegant form when written in terms of the Ramanujan theta function. Ramanujan theta function has several important applications. It is used to determine the critical dimensions in Bosonic string theory, superstring theory and M-theory.*

$$f(a,b) = \sum_{n=-\infty}^{\infty} a^{\frac{n(n+1)}{2}} b^{\frac{n(n-1)}{2}}$$

## #10 HIS MOCK MODULAR FORMS MAY UNLOCK THE SECRET OF BLACK HOLES

*In a 1920 letter to Hardy, Ramanujan described several new functions that behaved differently from known theta functions, or modular forms, and yet closely mimicked them. These were the first ever examples of mock modular forms. More than 80 years later, in 2002, a description for these functions was provided by Sander Zwegers. Further, Ramanujan predicted that his mock modular forms corresponded to ordinary modular forms producing similar outputs for roots of 1. Ken Ono ultimately showed that a mock modular form could be computed just as Ramanujan predicted. It was found as the output of mock modular forms shoot off to enormous numbers, the corresponding ordinary modular form expand at a similar rate and thus their difference is a relatively small number. Expansion of mock modular forms is now used to compute the entropy, or level of disorder, of black holes. Thus, even through black holes were virtually unknown during his time, Ramanujan was able to do maths which may unlock their secret.*

**Source:** https://learnodo-newtonic.com/ramanujan-achievements

@@@@@@@@@@@@@@@

# The Ramanujan Math Park

[https://gyanome.org/ramanujan-maths-park/]

[https://www.agastya.org/]

The Ramanujan Math Park is located inside Agastya Campus Creativity Lab, Kuppam AP, at the intersection of the states of Karnataka, Andhra Pradesh, and Tamil Nadu, in Southern India. It is a unique outdoor and indoor mathematical experience with large scale exhibits and interactive touch screen stations. The Math Park is a project by Gyanome non-profit organisation (www. gyanome.org) in collaboration with Agastya


Agastya International Foundation, in association with Gyanome Foundation, Imaginary and SBI Funds Management Private Ltd. the investment manager of SBI Mutual Fund, is inaugurating the Ramanujan Math Park on December 22, 2017, at its 172-acre Creativity Campus situated in Kuppam.

Agastya Campus covers an area of 172 acres and is visited by more than 500 students per day, whose curiosity is sparked by Agastya's hands-on teaching methods. Children are bussed in for lessons in science, math, and art, which augment the curriculum in the government schools. Agastya's instructors have

been able to improve upon their methods of educating children and to develop programs for training local teachers, as well. Camps are arranged for groups from schools in faraway cities, providing urban children with a rare opportunity to experience nature close up, in a rural environment. The campus also attracts teachers from private schools all over India, who come here to learn ways to infuse their own teaching with the Agastya spark.

Having drawn inspiration from the extraordinary works of Indian Mathematician, Srinivasa Ramanujan, the park aims to provide a space to promote learning, exploration, and discovery of ideas that convey a sense of the ubiquity of Math. By giving hands-on learning experience of math concepts, it aims to increase enthusiasm and reduce and eliminate obstacles in learning math, especially among economically underprivileged children.


## VISION

The Ramanujan Math Park is envisaged as an evolving platform for students, teachers and math enthusiasts to come together and communicate various mathematical ideas that will lead to greater engagement with the subject.

## MISSION

- To ignite curiosity and interest in mathematics by focusing on creating content that scaffolds as learning materials in schools, while being in lieu to the curriculum.
- To facilitate the learning of math concepts by developing exhibits, pedagogies and engaging activities.
- To instill a sense of appreciation and excitement in children by tapping into the mysteries, beauty and relevance of math.
- To make the learning of math contextual, conceptual and meaningful.

## OBJECTIVES

- ✓ To introduce the all-pervasive nature of mathematics by focusing on evolution, storytelling, and utility of various mathematical concepts.
- ✓ To facilitate a space for understanding the fundamentals of math, using interactive hands-on approach through the display of exhibits that

demonstrate connections between math and various other fields like architecture, music, arts, astronomy, physics, engineering, technology etc.

- ✓ To encourage and engage students and teachers to create content that is relevant to the Indian context and demonstrate their understanding of math by way of essays, competitions, etc.
- ✓ To inspire students by introducing and featuring the works of Indian mathematicians.
- ✓ To highlight the contributions of India and other civilizations in the evolution of mathematical ideas.
- ✓ To create digital content that aims at empowering teachers with teaching resources that helps them to engage and use technology meaningfully in classrooms.
- ✓ To document and preserve the existing mathematical knowledge present in rural India.
- ✓ To create a space where experts and reputed institutions from all over the world participate and support in evolving ideas, through talks, training, performances, etc.

The Ramanujan Math Park will focus on creating a learning environment that fosters and nurtures the desire to engage with mathematics in enriching ways, amongst broad strata of the society.

For VIRTUAL TOUR, please visit the web link:

https://imath.iiitb.ac.in/ramanujan-math-park/

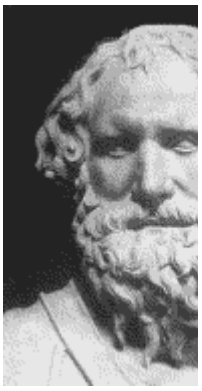
(😊)(😊)(😊)@@@@@@(😊)(😊)(😊)

*The*

# Hundred Greatest Mathematicians of the Past

**This is the long page, with list and biographies.**
(Click here for just the List, with links to the biographies. Or Click here for a List of the 200 Greatest of All Time.)


Isaac Newton


Archimedes


Carl Gauss


Leonhard Euler


Bernhard Riemann


David Hilbert


J.-L. Lagrange


Euclid


Alex. Grothendieck


G.W. Leibniz


John von Neumann


Henri Poincaré

Ranked in approximate order of "greatness."

Listed: The Mathematicians were born before 1930 and their work have **breadth**, **depth**, and **historical importance**.

https://fabpedigree.com/james/mathmen.htm

# The 10 best mathematicians

Selected Maths Geniuses whose revolutionary discoveries changed our world.

*Visit to know:*

https://www.theguardian.com/culture/2010/apr/11/the-10-best-mathematicians

**********

# *Greatest Mathematicians of All Time*
# *List of Top 11 Mathematicians*

Let's just admit that Mathematics is one of the most fun and popular subjects. People love Mathematics for various reasons. However, there are many who may feel slightly afraid thinking that it is way too confusing. Well, it is not. For people who have a hood teacher and guidance, Maths can become like a cakewalk. All you need to do is have some idea about the concepts of Mathematics. Following the life of the greatest mathematicians of all time can help you learn a lot.

Maths has had a contribution to the development of society as well. Most of the scientific discoveries were possible because of Maths. It allowed us to know the secrets of DNA, create and transmit electricity and also brought computers into existence. We owe the success and all these contributions to the greatest mathematician of all time. Read the article further to know some of the greatest Mathematicians.

The greatest mathematicians of all time have contributed significantly to the growth of the world. Most of them had also received awards and acknowledgements for their contribution to the field of Maths. Below is a list of all the greatest mathematicians of all time.

**Please visit to study them:**

https://www.embibe.com/exams/11-greatest-mathematicians-of-all-time/

| | |
|---|---|
| **1. Carl Friedrich Gauss**<br>**Born:** April 30, 1777, Braunschweig, Germany<br>**Died:** February 23, 1855, Göttingen, Germany<br>**Awards:** Copley Medal<br>**Education:** University of Helmstedt, University of Göttingen, Braunschweig University of Technology |  |

Carl Friedrich Gauss was a German mathematician who contributed significantly to many fields, including number theory, algebra, statistics, analysis, differential geometry, geodesy, geophysics, mechanics, electrostatics, astronomy, and matrix theory, and optics.

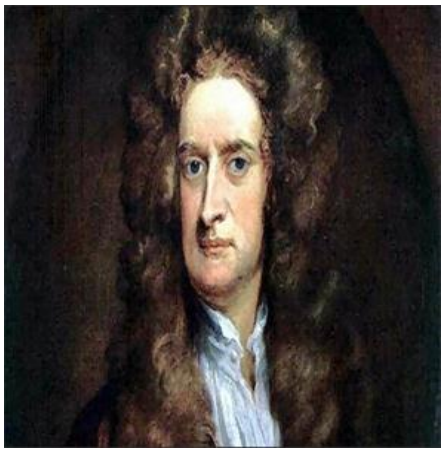
## 2. Leonhard Euler

**Born:** April 15, 1707, Basel, Switzerland
**Died:** September 18, 1783, Saint Petersburg, Russia
**Education:** University of Basel (1720–1723)
**Influenced:** Carl Friedrich Gauss, Joseph-Louis Lagrange, and more
**Spouse:** Salome Abigail Gsell (m. 1776–1783), Katharina Gsell (m. 1734–1773)

Leonhard Euler was a Swiss mathematician, physicist, astronomer, logician and engineer who made important and influential discoveries in many branches of mathematics like infinitesimal calculus and graph theory while also making pioneering contributions to several branches such as topology and analytic number theory. He also introduced much of the modern mathematical terminology and notation, particularly for mathematical analysis, such as the notion of a mathematical function.

## 3. Isaac Newton

**Born:** January 4, 1643, Woolsthorpe-by-Colsterworth, United Kingdom
**Died:** March 31, 1727, Kensington, London, United Kingdom
**Full name:** Sir Isaac Newton
**Education:** Trinity College, Cambridge (1667–1668), The King's School, Grantham (1955-1959)



Sir Isaac Newton PRS was an English mathematician, astronomer, and physicist who is widely recognised as one of the most influential scientists of all time and a key figure in the scientific revolution.

## 4. Euclid

**Born:** Alexandria, Egypt
**Nationality:** Greek
**Influenced:** Stilpo, Thrasymachus of Corinth, Clinomachus, Eubulides, Ichthyas
**Teacher:** Archimedes
**Field:** Mathematics

Euclid of Megara was a Greek Socratic philosopher who founded the Megarian school of philosophy. He was a pupil of Socrates in the late 5th century BCE and was present at his death. He held the supreme good to be one, eternal and unchangeable and denied the existence of anything contrary to the good.

## 5. Srinivasa Ramanujan

**Born:** December 22, 1887, Erode
**Died:** April 26, 1920, Kumbakonam
**Spouse:** Janakiammal (m. 1909–1920)
**Education:** Trinity College, Cambridge (1919–1920), University of Cambridge (1914-1919)
**Parents:** Komalatammal, K. Srinivasa Iyengar

Srinivasa Ramanujan was an Indian mathematician who made significant contributions to mathematical analysis, number theory and continued fractions. At age 31 Ramanujan was one of the youngest Fellows in the history of the Royal Society. He was elected "for his investigation in Elliptic functions and the Theory of Numbers." On 13 October 1918, he was the first Indian to be elected a Fellow of Trinity College, Cambridge. He is considered to be one of the best Indian mathematicians.

## 6. Pierre de Fermat

**Born:** August 17, 1601, Beaumont-de-Lomagne, France
**Died:** January 12, 1665, Castres, France
**Education:** University of Orléans (1623–1626)
**Spouse:** Louise Long Fermat (m. ?–1665)
**Books:** Writings on Geometrical Loci
**Parents:** Dominique Fermat, Françoise Cazeneuve Fermat

Pierre de Fermat, A French mathematician who is often called the founder of the modern theory of numbers. Fermat developed a system of analytic geometry which both preceded and surpassed that of Descartes; he developed methods of differential and integral calculus which Newton acknowledged as an inspiration. He was also the first European to find the integration formula for the general polynomial, he used his calculus to find centres of gravity etc.

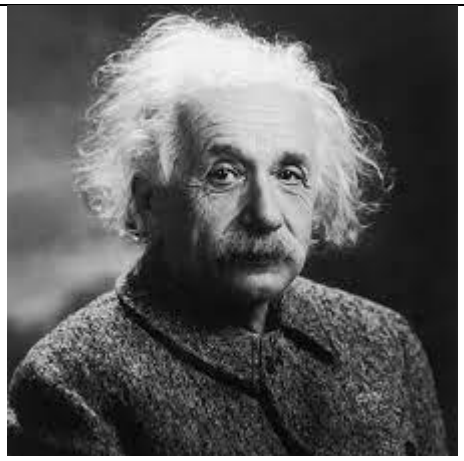
## 7. Gottfried Wilhelm Leibniz

**Born:** July 1, 1646, Leipzig, Germany
**Died:** November 14, 1716, Hanover, Germany
**Influenced:** Ferdinand Georg Frobenius, more
**Education:** Leipzig University, University of Altdorf, University of Jena
**Influenced by:** René Descartes, Baruch Spinoza, Blaise Pascal and many more.

Leibniz pioneered the common discourse of mathematics, including its continuous, discrete, and symbolic aspects. His ideas on symbolic logic weren't pursued and it was left to Boole to reinvent this almost two centuries later.

## 8. Albert Einstein

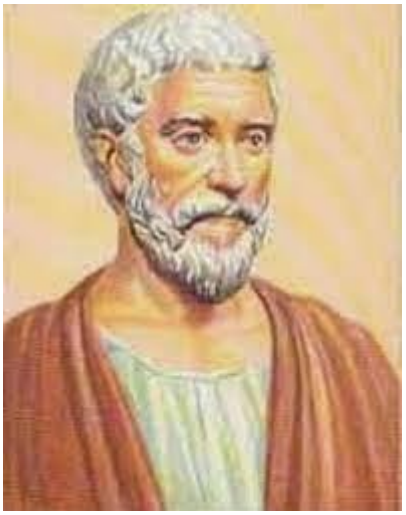
**Born:** March 14, 1879, Ulm, Germany
**Died:** April 18, 1955, Princeton, New Jersey, United States
**Influenced:** Satyendra Nath Bose, Leo Szilard, Wolfgang Pauli, and more
**Influenced by:** Isaac Newton, Mahatma Gandhi and many more.



Albert Einstein was unquestionably one of the two greatest physicists in all of history. The atomic theory achieved general acceptance only after Einstein's 1905 paper which showed that atoms' discreteness explained Brownian motion. Another 1905 paper introduced the famous equation $E = mc^2$. Einstein published at least 300 books or papers on physics altogether.

## 9. Pythagoras

**Areas of interest:** Politics, Mathematics, Metaphysics, Ethics, Music
**Influenced:** Philolaus, Empedocles, Plato, Alcmaeon of Croton, Euclid, Johannes Kepler, Parmenides, Hippasus
**Philosophical era:** Ancient philosophy
**Schools of thought:** Pythagoreanism
**Influenced by:** Thales of Miletus, Anaximander, Pherecydes of Syros, Themistocles



Pythagoras discovered that harmonious intervals in music are based on simple rational numbers. This led to a fascination with integers and mystic numerology. The Pythagorean Theorem was known long before Pythagoras, but he is often credited with the first proof. Apastambha proved it in India at about the same time; some conjecture that Pythagoras journeyed to India and learned of the proof there.

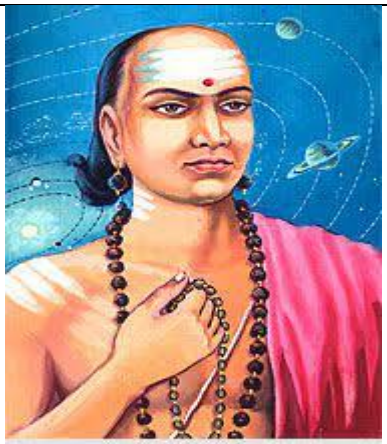
## 10. René Descartes

**Born:** March 31, 1596, Descartes, Indre-et-Loire, France
**Died:** February 11, 1650, Stockholm, Sweden
**Influenced:** Noam Chomsky, Baruch Spinoza, Slavoj Žižek, more
**Influenced by:** Aristotle, Plato, Thomas Aquinas, Archimedes and many more.

René Descartes is considered the inventor of both analytic geometry and symbolic algebraic notation. His use of equations to partially solve the geometric problem of Pappus revolutionized mathematics.

## 11. Aryabhata

**Born:** 476 AD, Assaka
**Died:** 550 AD, India
**Nationality:** Indian
**Books:** Aryabhatiya
**Main interests:** Mathematics, Astronomy
**Influenced:** Lalla, Bhāskara I, Brahmagupta, Varāhamihira


Aryabhata

Indian mathematicians excelled for thousands of years, and eventually even developed advanced techniques like the Taylor series before Europeans did, but they are denied credit because of Western ascendancy. Among the Hindu mathematicians, Aryabhata known as Arjehir by Arabs, maybe the most famous. Aryabhata is famous for the identity $\Sigma (k3) = (\Sigma k)2$. His most famous accomplishment in mathematics was the Aryabhata Algorithm for solving Diophantine equations. He made several important discoveries in astronomy.

**********

# The Greatest Mathematicians
## A Data Visualisation

Our modern society is built upon mathematics. And mathematics is built upon the achievements of thousands of outstanding individuals. Explorers, creators, problem solvers… they each pushed the boundaries of knowledge and invented new methods of thinking about the world.

Who was the greatest mathematician of all time? How would you even decide? Is it the most creative genius? The most prolific? The one who solved the most important problem?

This article presents a visualisation of the greatest mathematicians, ranked according to how much **influence** they have on mathematics today.


The main sections are:

- The interactive data visualisation.

- Comments on the overall top 10 ranked mathematicians.
- A list of top-ranked mathematicians by field.
- A discussion of the ranking methodology.

**Please visit the web link to get real inter-active experience:**

**https://www.cantorsparadise.com/the-greatest-mathematicians-a-data-visualisation-716a629ff6a2**

**You can tap a mathematician's image to show their name and more information, or tap a topic button to show the top-ranked mathematicians for that topic.**

**********

# SAPAVIVA

## Welcome to sapaviva.com:

Your definitive guide to the world's preeminent scientists (and mathematicians). My desire to study, evaluate and comparatively analyze remarkable works of science: from antiquity to the year 2000 AD inspired this publication. The unrestricted scope spanned across vast discoveries in pure and applied sciences. It is the most encompassing, the most researched, as well as the most unbiased rankings of scientists (including mathematicians) from every part of the world. …A product of over 15 years research and in-depth analyses of the most spectacular innovations this world has ever witnessed. My narratives on this website are ample overviews which were concisely structured for your easy reading. The rankings were based on merit. My four evaluative criteria (each of which bears 25% of the assessment points) are: overall ability, versatility, productivity and developmental influences. To peruse any of those scientists, click on the name or on the portrait. You may also use the *more information* button, which is situated directly beneath this

paragraph, to access additional details. Your views (whether criticisms or compliments) are welcomed; so, feel free to voice your opinion via the ***Leave A Reply*** contact channel.
Thank you, and do enjoy your visit.

This Web Page contains:

- 100 Greatest Scientists
- 50 Greatest Mathematicians
- 200 Quotes of Valentine Oduenyi

**********

## EARLIEST MATHEMATICIANS

Little is known of the earliest mathematics, but the famous *Ishango Bone* from Early Stone-Age Africa has tally marks suggesting arithmetic. The markings include six prime numbers (5, 7, 11, 13, 17, 19) in order, though this is probably coincidence.

Some of the earliest arithmetic was for economic transactions; this informs us not just about ancient math but about the socio-economic structure of the earliest civilizations. Measuring real estate or silver accurately would have been unnecessary in collectivist societies, or if informal gift exchanges were the norm. In addition to developing geometry to measure irregular-shaped plots of land, both ancient Sumerians and ancient Harappa developed small weights. The Sumerian system was based on grains of barley; a common weight was about 420 milligrams, which is 1/20 of the shekel used in southern Mesopotamia or allegedly the weight of nine grains of barley. Dr, William Hafford made an interesting discovery: He found a set of agate weights weighing 1, 2, 3, 5 or 8 times that 9-grain unit. The

Fibonacci numbers! Hafford shows that the Fibonacci numbers allow a convenient weighing procedure. Tiny agate weights of 1/3 or 2/3 of that 9-grain unit have also been found. Such weights could only have been used for weighing very precious things: silver and gold, or perhaps spice. (No such tiny Harappan weight has turned up. Their weights followed a binary system: 1, 2, 4, 8, 16, 32, 64 -- convenient for a different weighing procedure.)

The advanced artifacts and architectures of Egypt's Old Kingdom and the Indus-Harrapa civilization imply strong mathematical skill, but the first written evidence of advanced arithmetic dates from Sumeria, where 4500-year old clay tablets show multiplication and division problems; the first abacus may be about this old. By 3600 years ago, Mesopotamian tablets show tables of squares, cubes, reciprocals, and even logarithms and trig functions, using a primitive place-value system (in base 60, not 10). Babylonians were certainly familiar with the Pythagorean Theorem; the Plimpton 322 artifact from about the time of Hammurabi the Great contained a table of Pythagorean triples (possibly used to assist land mensuration); some of these triplets are so large (one is 12709, 13500, 18541 -- generated by p=125, q=54) that they almost certainly knew the Pythagorean generating formula. Ancient Mesopotamians also had solutions to quadratic equations and even cubic equations (though they didn't have a general solution for these); they eventually developed methods to estimate terms for compound interest. The Greeks borrowed from Babylonian mathematics, which was the most advanced of any before the Greeks; but there is no ancient Babylonian mathematician whose name is known.

Also at least 3600 years ago, the Egyptian scribe Ahmes produced a famous manuscript (now called the *Rhind Papyrus*), itself a copy of a

late Middle Kingdom text. It showed simple algebra methods and included a table giving optimal expressions using Egyptian fractions. (Today, Egyptian fractions lead to challenging number theory problems with no practical applications, but they may have had practical value for the Egyptians. To divide 17 grain bushels among 21 workers, the equation 17/21 = 1/2 + 1/6 + 1/7 has practical value, especially when compared with the "greedy" decomposition 17/21 = 1/2 + 1/4 + 1/17 + 1/1428.)

The Pyramids demonstrate that Egyptians were adept at geometry, though little written evidence survives. Babylon was much more advanced than Egypt at arithmetic and algebra; this was probably due, at least in part, to their place-value system. But although their base-60 system survives (e.g. in the division of hours and degrees into minutes and seconds) the Babylonian notation, which used the equivalent of IIIIII XXXXXIIIIIII XXXXIII to denote 417+43/60, was unwieldy compared to the "ten digits of the Hindus." (In 2016 historians were surprised to decode ancient Babylonian texts and find very sophisticated astronomical calculations of Jupiter's orbit.)

The Egyptians used the approximation $\pi \approx (4/3)^4$ (derived from the idea that a circle of diameter 9 has about the same area as a square of side 8). Although the ancient Hindu mathematician Apastambha had achieved a good approximation for $\sqrt{2}$, and the ancient Babylonians an ever better $\sqrt{2}$, neither of these ancient cultures achieved a $\pi$ approximation as good as Egypt's, or better than $\pi \approx 25/8$, until the Alexandrian era.

The sudden blossoming of math in the Iron Ages of India and Greece owes much to the ancient mathematics of Egypt and Babylonia.

**********

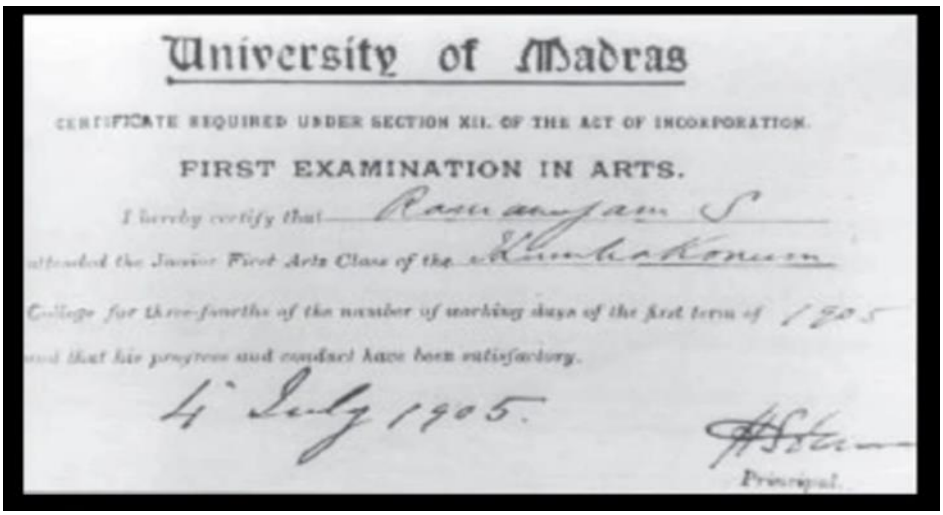
## Early Vedic mathematicians

The greatest mathematics before the Golden Age of Greece may have been in India's early Vedic (Hindu) civilization. The Vedics understood relationships between geometry and arithmetic, developed astronomy, astrology, calendars, and used mathematical forms in some religious rituals.

The earliest mathematician to whom definite teachings can be ascribed was Lagadha, who apparently lived about 1300 BC and used geometry and elementary trigonometry for his astronomy. Baudhayana lived about 800 BC and also wrote on algebra and geometry; Yajnavalkya lived about the same time and is credited with the then-best approximation to π. Apastambha did work summarized below; other early Vedic mathematicians solved quadratic and simultaneous equations.

Other early cultures also developed some mathematics. The ancient Mayans apparently had a place-value system with zero before the Hindus did; Aztec architecture implies practical geometry skills. Ancient China certainly developed mathematics; in fact the first known proof of the Pythagorean Theorem is found in a Chinese book (*Zhoubi Suanjing*) which *might* have been written about 1000 BC.

(😊)(😊)(😊)(😊)(😊)



University of Madras

CERTIFICATE REQUIRED UNDER SECTION XII. OF THE ACT OF INCORPORATION.

FIRST EXAMINATION IN ARTS.

I hereby certify that Ramanujan S

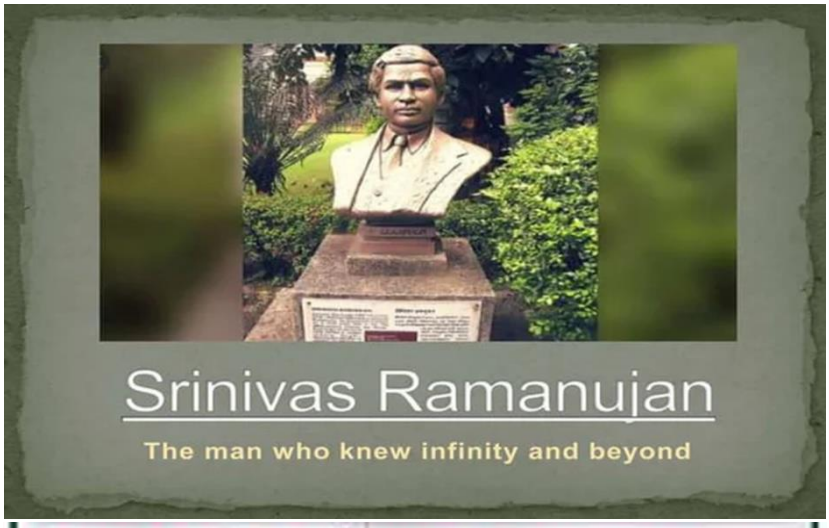
attended the Junior First Arts Class of the Kumbakonam

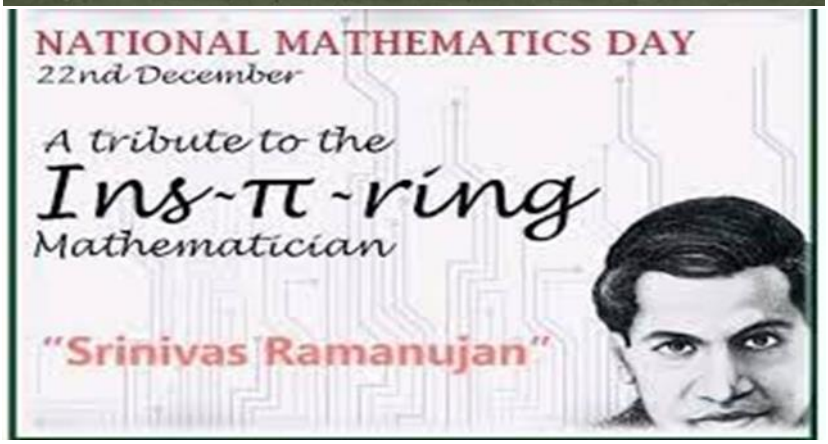
College for three-fourths of the number of working days of the first term of 1905

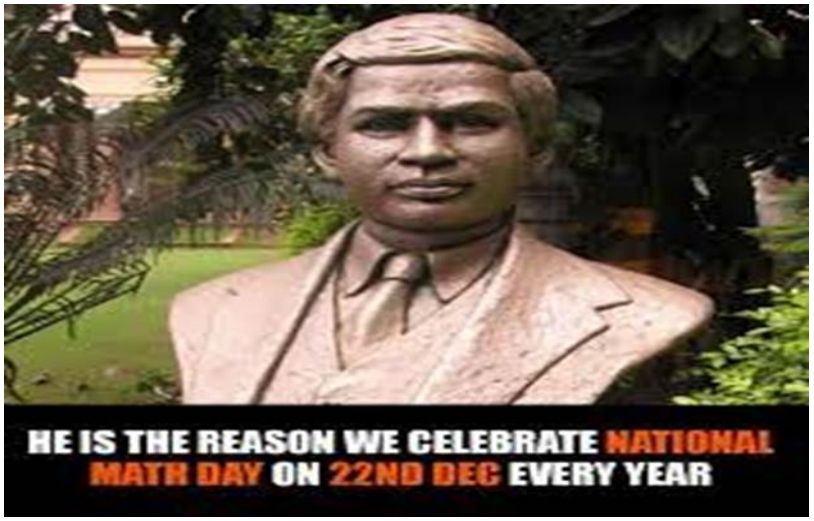
and that his progress and conduct have been satisfactory.

4th July 1905.

Principal.




ISBN 978-81-984029-3-6